Consortium for Unfavorable Rice Environment (CURE) Working Group 1 : Drought-prone Rainfed Lowlands Ubon Ratchathani and Nakorn Ratchasima, Thailand

Varapong Chamarerk[1)] Yothin Konboon[1)] Waraporn Wongboon[1)],
Boonrat Jongdee[1)] Panya Romyen[2)] Sommai Lertna[2)]

Abstract

The objectives of this project were to reduce risk, enhance crop productivity and develop natural resources management practices for drought-tolerant or drought-avoiding, responsive varieties for both transplanting and direct-seeded systems. Activities included 1) germplasm improvement and 2) crop management practices. *For germplasm improvement*, at least 10 improved varieties and advanced breeding lines were evaluated in a minimum of eight farmers' fields per key site with participation of farmers and extension service providers. Researchers tested 20 short- and mid-duration advanced backcross derivatives of KDML105, which were chosen for their blast resistance, at three sites in Phimai District, Nakorn Ratchasima Province, and at two sites in Roi Et Province. Two years of on-farm tests showed that KDML105-backcross derivatives yielded 1.7 t ha^{-1} when severe drought occurs at flowering and grain-filling. The first short-duration KDML backcross derivative was tolerant to blast and matures approximately one to two weeks earlier than KDML105, which reduces its exposure to late-season drought frequently occurring in Northeastern Thailand. It was used and tested in several of the CURE trials and officially released as RD33 on March 6, 2007. *For crop management practices*, improved establishment and weed control methods were evaluated in a minimum of eight farmers' fields per key site with participation of farmers and agricultural development workers. Participatory experiments were conducted on five upper and five lower fields in Phimai District to evaluate the effectiveness of pre-emergence and post-emergence herbicides treatments in direct-seeded crops relative to water level fluctuations on weed pressure. The second activity evaluated farmers' usual weed management to plots that were clean weeded by hand. The third activity tested a rice-mungbean intercrop system

1) Ubon Rachathani Rice Research Center, P.O.Box 65, Mueang, Ubon Rachathani 34000, Tel. 045 344103

2) Nakornratchasima Rice Research Center, Pimai, Nakornratchasima

with six farmers, as farmers had indicated an interest in this practice. Weed pressure reduced yields by an average 0.6 t ha^{-1} in direct-sown fields relative to cleanly weed crops. Complete weed control resulted in a 25-30 percent yield increase in direct-seeded crops. *For nutrient management*, improved nutrient management methods that take into account water status and pest risk were evaluated in a minimum of eight fields per key site with participation of farmers and extension workers. The observed farmers' practice of using fertilizers, which may be as much as 85 percent below the current recommended rates, was highly field-specific and cost-efficient, and maintained system productivity. Participatory experiments evaluating fertilizer treatments were conducted on 10 farms at the Roi Et site. The results showed that farmers' low fertilizer rates are as productive but often more profitable than recommended doses for traditional-type varieties like RD6, RD15, and KDML105, which can yield up to 4.0 t ha^{-1} only under favorable conditions of standing water (usually occurring in lower fields) and in soils with a clay content greater than 5 percent. On-farm trials verified the effectiveness of farmers' practice of applying low N rates on N-use efficiency in tests on eight fields each in upper and lower terraces in Roi Et Province. In general, the tests showed that small rates of fertilizer (20-8.7-8.3 NPK ha^{-1}) could get as good results as medium rates (40-8.7-8.3 NPK ha^{-1}). But the amount of improvement on crop growth and yield depended on the field position in the toposequence. On upper terraces, the tests showed that fertilizer could significantly improve crop growth and grain yield, but the amount of improvement diminished quickly as higher rates were applied. A doubled rate of N brought about only a slight improvement of crop growth and yield. On lower terraces, even low fertilizer rates (20-8.7-8.3 NPK ha^{-1}) could only slightly improve crop growth and yield, and a doubled N rate (40-8.7-8.3 NPK ha^{-1}) did not increase yields significantly.

Keywords: rainfed lowland rice, drought, variety, weed, fertilizer, nitrogen, yield